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Datasheet AVS701

**Highly Accurate Air / Gas Velocity
Sensor for Industrial Applications**



AVS701

Highly Accurate Air/Gas Velocity Sensor for Industrial Applications

The AVS701 air/gas velocity (v) and temperature (T) sensor is optimised for best measurement results and reliability in challenging industrial applications from 0 up to 40 m/s (0 to 8 000 ft/min) and -40...+140 °C (-40...+284 °F).

Measurement Performance

The AVS701 features best-in-class accuracy and durability by employing a high-end ceramic sensing element. The constant temperature anemometry working principle rests on the state-of-the-art thin film technology. The probe alignment key included in the scope of supply is essential to achieve excellent measurement results. This Poka-Yoke-inspired mounting tool simplifies the quick and correct installation of the remote probe.

Long-Term Stability

The robust probe design and the E+E sensing element construction significantly extend the service lifetime of the AVS701. Probe and sensor head are made of stainless steel, suitable for challenging mechanical and chemical environment. A proprietary coating protects the sensing element against corrosion and aggressive substances.

Versatility

The AVS701 is available for wall or duct mount as well as with remote probe. The remote probe features various cable lengths and pressure rating up to 10 bar (145 psi). The modular IP65 polycarbonate or die-cast aluminium enclosure facilitates installation and maintenance. The wiring can be done either via M12 connectors or directly to internal terminals.

Display and Outputs

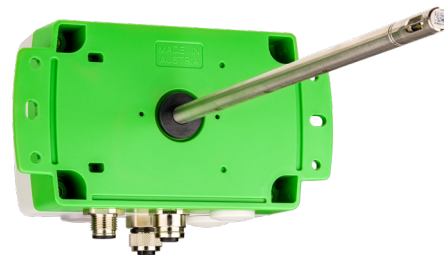
The measured data is available on two analogue outputs and on the RS485 interface with Modbus RTU protocol. The display shows up to three measurands simultaneously. Measurand visualization via linear gauges with configurable upper and lower limits gives a quick view onto the actual process status. Optical indication of sensor and measurement status facilitates diagnosis for AVS701 without display.

Configurable and Adjustable

AVS701 configuration and adjustment can be performed with the free PCS10 Product Configuration Software and the USB interface.



Wall mounting version with remote probe, die-cast enclosure



Duct mount version, polycarbonate enclosure

Features

Measurement performance

- Best-in-class accuracy
- Measuring range $-40...+140\text{ °C}$ ($-40...+284\text{ °F}$) and up to 10 bar (145 psi)

Display

- Shows up to 3 measurands simultaneously
- Freely selectable layout and measurands
- Linear gauges for quick perception

Enclosure

- IP65 protection rating
- Polycarbonate or die-cast aluminium
- Easy mounting and service
- Versatile connection options

Sensor control port

- Connector for external pressure probe (optional)
- Realtime pressure compensation

USB-C service interface

- Configuration, adjustment and firmware update
- Short-term power supply via USB
- Device status indication via illuminated port

Outputs

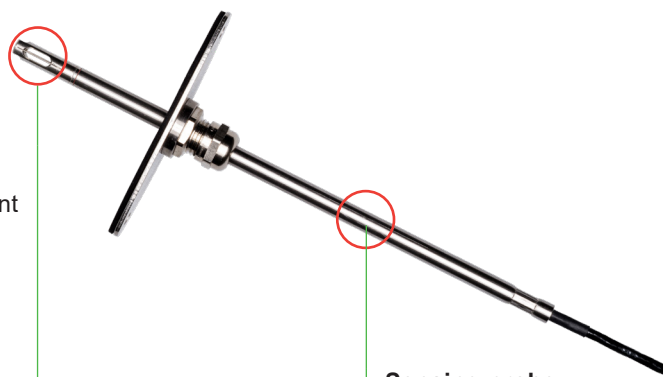
- 2 freely scalable analogue outputs, current/voltage
- Error indication according to NAMUR
- Modbus RTU
- 2 alarm outputs
- Configurable via software

Sensing element

- Accurate air velocity measurement from 0.06 m/s to 40 m/s (12 to 8000 ft/min)
- Low angular dependency
- Long-term stability

Sensing probe

- Poka-Yoke inspired probe alignment key
- Probe choice depending on
 - T range
 - p range
 - Environmental condition
- Various probe and cable lengths



Inspection certificate

According to DIN EN 10204-3.1

Features

Sensing Element Protection

Proprietary hermetic polymer coating (varnish) protects the sensing element from corrosion in demanding environment and substantially extends sensor lifetime in applications with H₂O₂ sterilisation.

Sensor Control Port

The sensor control port is an RS485 interface with Modbus RTU protocol for the optional external pressure probe. The pressure data allow for the realtime calculation of the actual flow, can be shown on the display and is available on the outputs. A suitable pressure probe is available as an accessory.

Accredited Traceable Calibration Certificate



Internationally recognised certificates for the calibration of measuring instruments from accredited laboratories document the traceability of the measurements to the International System of Units (SI). The E+E Elektronik calibration laboratory offers two levels of traceable calibrations.

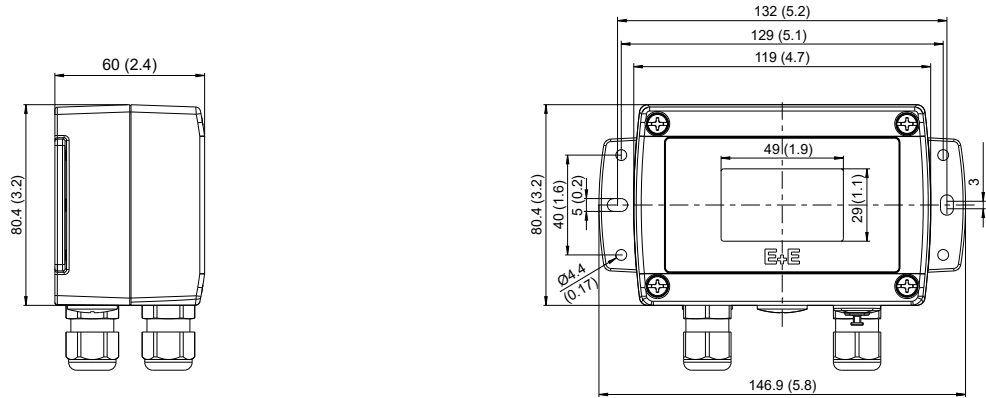
- As a Designated Institute (DI) of the Republic of Austria, the E+E calibration laboratory maintains Austria's national measurement standards for humidity, dew point temperature, air velocity and CO₂. This authorises the E+E calibration laboratory to issue calibration certificates at the level of a National Metrological Institute (NMI).
- The E+E calibration laboratory is accredited by Akkreditierung Austria in accordance with DIN EN ISO/IEC 17025 with the identification number 0608. This allows the laboratory to issue ISO 17025 certificates for the measurands humidity, temperature, dew point temperature, air velocity, flow, pressure and CO₂.

Visit www.eplusecal.com for detailed information on calibration and to enquire a certificate of accredited traceable calibration for the AVS701 from the Designated Institute.

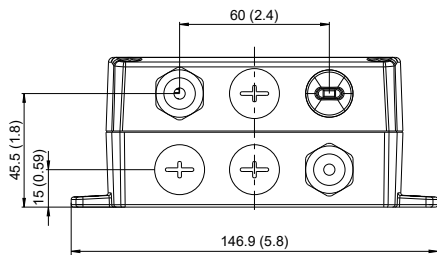
Dimensions

Values in mm (inch)

Enclosure

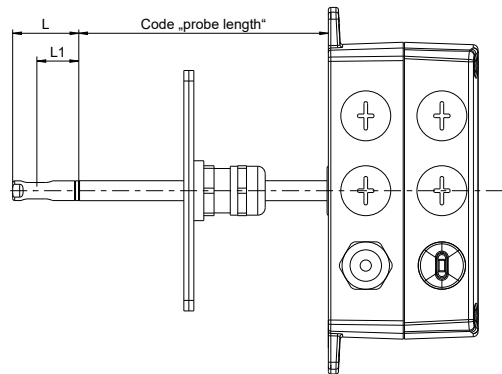


Connector side view



Type T2

Duct mount



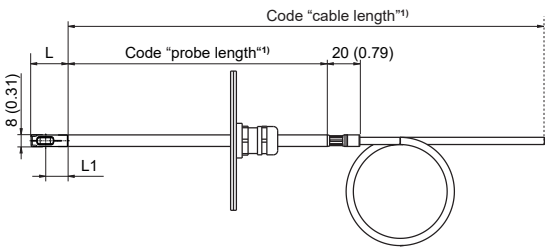
Sensing head	L	L1
Stainless steel	26.5 (1.04)	16.8 (0.66)

Dimensions

Values in mm (inch)

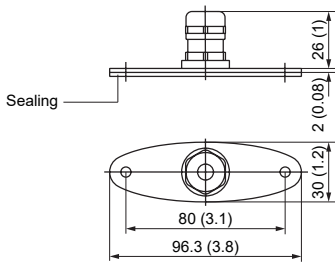
Type T3 Probe

Remote probe



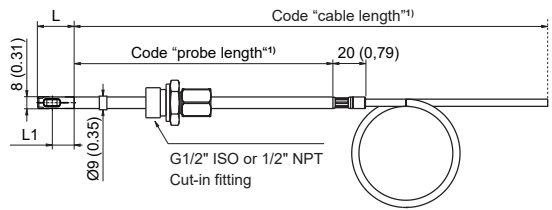
Mounting flange

Within scope of supply for T2 and T3



Type T26 Probe

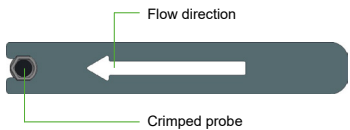
Remote probe, pressure-tight up to 10 bar (150 psi) with cut-in fitting



1) Refer to ordering guide

Probe alignment key

Poka-yoke inspired tool, only one direction possible
Within scope of supply for types T3 and T26



Technical Data

Measurands

Air Velocity Standardised (vn)

Measuring range	0...2 m/s (0...400 ft/min) 0...15 m/s (0...3 000 ft/min) 0...40 m/s (0...8 000 ft/min)	
Accuracy in air at 23 °C (73 °F) and 1 013 mbar (14.7 psi), including non-linearity, hysteresis and repeatability 0.06...2 m/s (12...400 ft/min) 0.15...15 m/s (30...3 000 ft/min) 0.20...40 m/s (40...8 000 ft/min)	±0.03 m/s (6 ft/min) ±(0.10 m/s (20 ft/min) + 1 % of mv) ±(0.20 m/s (40 ft/min) + 1 % of mv)	mv = measured value
Uncertainty of factory calibration	±1 % of mv, min. 0.015 m/s (3 ft/min)	mv = measured value
Dependency of inflow angle (α)	<3 % for α < ±10°	
Influence of the reverse flow, typ.	<2 % of mv	mv = measured value
Response time t ₉₀ , typ.	0.1...35 s (Factory setting: 1.7 s; configurable via PCS10 in 9 steps)	
Temperature dependency of electronics, typ.	±0.01 % of mv/K deviating from 25 °C (77 °F)	mv = measured value
Temperature dependency of probe, typ.	±0.1 % of mv/K deviating from 25 °C (77 °F)	mv = measured value
Warm-up time	<5 s	

Temperature (T)

Measuring range	-40...+140 °C (-40...+284 °F)	
Accuracy in air at 23 °C (73 °F) at vn ≥ 1 m/s (200 ft/min)	±0.5 °C (±0.9 °F)	
Temperature dependency of electronics, typ.	±0.005 % of mv/K, deviating from 25 °C (77 °F)	mv = measured value
Temperature dependency of probe, typ.	±0.1 % of mv/K, deviating from 25 °C (77 °F)	mv = measured value
Response time t ₉₀ , typ.	≤10 s	

Outputs

Analogue

Two freely selectable and scalable outputs for vn, T, V'n	0 - 10 V 0 - 20 mA / 4 - 20 mA (3-wire)	-1 mA < I _L < 1 mA R _L ≤ 350 Ω	I _L = load current R _L = load resistance
Accuracy @23 °C (68 °F)	±0.05 % FS		FS = full scale (20 mA, 10 V)
Temperature dependency ¹⁾	±0.005 % FS / °C		FS = full scale (20 mA, 10 V)
NAMUR Factory settings	11 V or 21 mA		

1) Deviating from 23 °C (68 °F), defined at 12 mA or 5 V, respectively

Digital

Digital interface Protocol Factory settings Supported Baud rates	RS485 (AVS701 = 1 unit load) Modbus RTU 9 600 Baud, 8 data bits, parity none, 1 stop bit, Modbus address 47 9 600, 19 200, 38 400, 57 600, 76 800 and 115 200
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Switching Outputs (Optional)

2 switching outputs	Potential-free (Opto-MOS)
Switching capacity	Max. 24 V DC, 1 A

Technical Data

General

Power supply class III  USA & Canada: Class 2 supply necessary		24 V DC ±20 %
Current consumption	Typ. With Display	<100 mA <160 mA
Electrical connection		M12x1 plug or via M16 cable gland to internal terminals
Temperature working range		
Probe and sensing element		-45...+160 °C (-40...+320 °F) ¹⁾
Probe cable		-40...+180 °C (-40...+356 °F)
Enclosure		-40...+60 °C (-40...+140 °F)
Enclosure with display		-30...+60 °C (-22...+140 °F)
Pressure working range		
T2, T3 T26		700...1300 mbar (10.2...18.9 psi) Pressure-tight 0.05...10 bar (0.73...145 psi)
Humidity working range		0...99 %RH, non-condensing
Storage conditions		-20...+70 °C (-4...+158 °F) 0...95 %RH, non-condensing
Protection rating		IP65/NEMA 4X
Material		
Probe incl. head		Stainless steel 1.4404
Probe cable jacket		PTFE (Polytetrafluoroethylene)
Sensing element		Ceramics with polymer finish
Enclosure		Die-cast aluminium AlSi9Cu3 or PC (Polycarbonate)
Electromagnetic compatibility		EN 61326-1 EN 61326-2-3 Industrial Environment FCC Part15 Class B ICES-003 Class B
Configuration und adjustment		PCS10 via USB
Conformity		 

1) Without power supply

Ordering Guide

Feature		Description	Code		
Hardware Configuration			AVS701-		
	Type	Duct mount	T2		
		Remote probe		T3	
		Remote probe, pressure-tight, 10 bar (145 psi)			T26
	Enclosure material	PC (Polycarbonate)	HS1		
		Die-cast aluminium (AlSi9Cu3)	HS3		
	Process connection	G 1/2" ISO - cut-in fitting, Ø8 mm (0.31")			PA29
		1/2" NPT - cut-in fitting, Ø8 mm (0.31")			PA30
	Measuring range	0...2 m/s (0...400 ft/min)		HV23	
		0...15 m/s (0...3 000 ft/min)	HV27	HV27	HV27
		0...40 m/s (0...8 000 ft/min)	HV30	HV30	HV30
	Probe length	100 mm (3.94")	L100	L100	
		200 mm (7.87")	L200	L200	L200
		400 mm (15.75")	L400	L400	L400
		600 mm (23.62")		L600	L600
	Probe cable length (incl. probe length)	2 m (6.6 ft)		K2	K2
		5 m (16.4 ft)		K5	
		10 m (32.8 ft)		K10	K10
	Display	Without display	No code		
		Display with backlight	D2		
	Electrical connection	Cable glands	No code		
		1 plug for power supply and outputs	E4		
		1 plug for power supply + outputs and 1 socket for RS485	E6		
		1 M12 plug, 4 poles, for RS485 (with A0 only)	E9		
	Analogue output	0 - 10 V or 4 - 20 mA ¹⁾	No code		
		No analogue output (does not require the analogue output configuration)	A0		
	Digital interface	RS485 with Modbus RTU	J3		
	Sensor control port	Without sensor control port	No code		
		Modbus RTU via M12 socket	SCP1		
	Additional module	Without additional module	No code		
		2 potential-free switching outputs with cable gland	AM10		

1) Applies to both analogue outputs.

Ordering Guide (cont'd)

Feature	Description	Code
Software Configuration	Output signal	0 - 10 V ¹⁾ 4 - 20 mA ¹⁾ RS485 digital interface
		GA3 GA6 No code
	Output 1 measurand	Temperature T [°C] Temperature T [°F] Air velocity v [m/s] Air velocity v [ft/min] Air velocity standardised v _n ²⁾ [m/s] Air velocity standardised v _n ²⁾ [ft/min] Volume flow standardised V _n [m³/min] Volume flow standardised V _n [ft³/min] Volume flow V' [m³/min] Volume flow V' [ft³/min]
		No code MA2 MA20 MA21 MA22 MA23 MA84 MA87 MA89 MA90
	Output 1 scaling low	0 Value
		No code SALValue
	Output 1 scaling high	50 Value
		No code SAHValue
	Output 2 measurand ³⁾	Air velocity standardised v _n ²⁾ [m/s] Air velocity standardised v _n ²⁾ [ft/min] Air velocity v [m/s] Air velocity v [ft/min] Temperature T [°C] Temperature T [°F] Volume flow standardised V _n [m³/min] Volume flow standardised V _n [ft³/min] Volume flow V' [m³/min] Volume flow V' [ft³/min]
		No code MB23 MB20 MB21 MB1 MB2 MB84 MB87 MB89 MB90
	Output 2 scaling low	0 Value
		No code SBLValue
	Output 2 scaling high	40 Value
		No code SBHValue
	Medium 1	Air Nitrogen CO ₂ Argon
		No code MUA2 MUA3 MUA7
	Medium 2 ⁴⁾	No additional medium Air Nitrogen CO ₂ Argon
		No code MUB1 MUB2 MUB3 MUB7
	Duct cross section ³⁾⁵⁾	Factory pre-setting Value in [mm²]
		No code DCValue
	Protocol	Modbus RTU
		P1
	Measurand displayed 1	Air velocity v [m/s] Other
		DA20 DAxx
	Measurand displayed 2	Temperature T [°C] Other
		DB1 DBxx
Accredited traceable calibration certificate in accordance with DIN EN ISO/IEC 17025		see www.eplusecal.com

1) Applies to both analogue outputs.

2) Standardised air velocity v_n at standard conditions (factory setup): T_n = 23 °C (73 °F), p_n = 1 013.25 mbar (14.7 psi), settable via PCS10

3) Only in combination with volume flow measurement. Mx89: DC value in mm², Mx90: DC value in inch².

4) Optional. If not applicable, then "No Code".

5) Required for volume flow measurement in RS485 version, value in mm², factory pre-setting 8 000 mm² (12.4 inch²).

Code for measurand displayed in the Ordering Guide

Measurand	Unit	Code
		DAxx / DBxx
Temperature	T	°C
		°F
Air velocity standardised	v _n	m/s
		ft/min
Volume flow standardised	V _n	m³/min
		SCFM
Pressure	p	mbar
		psi

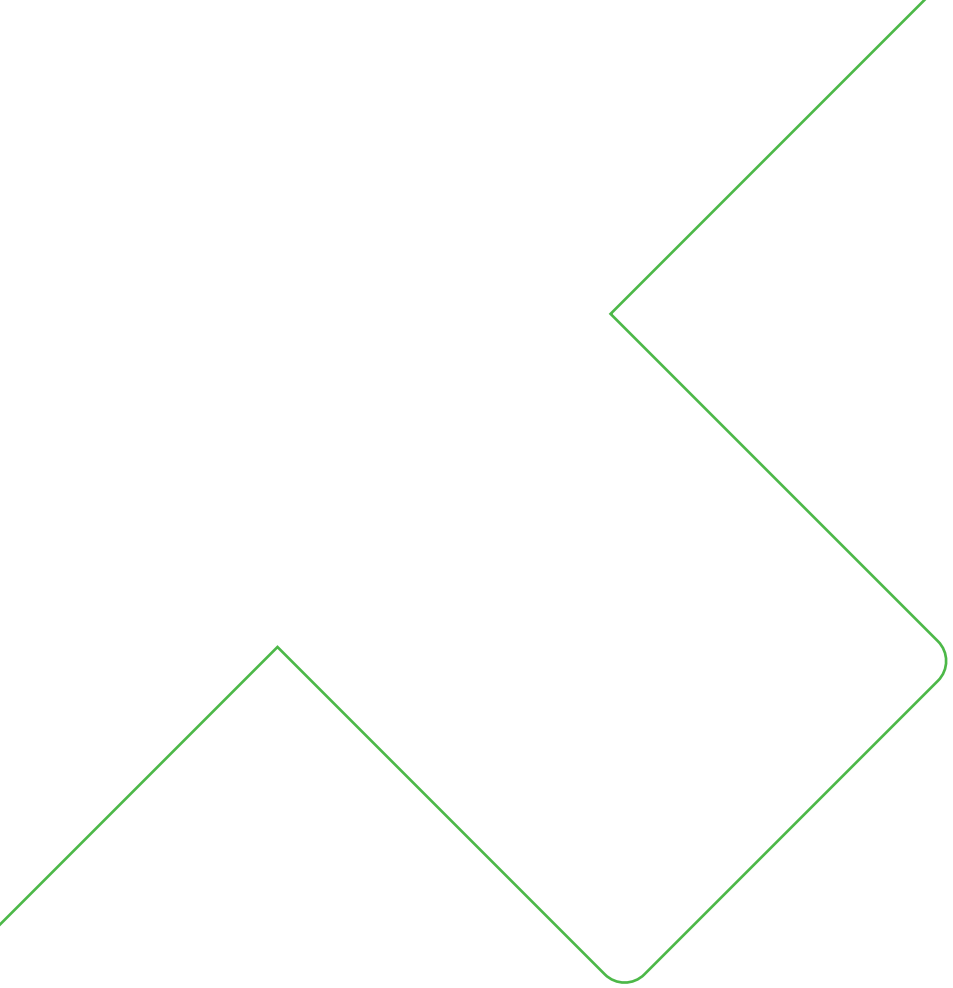
Order Example

AVS701-T3HS3HV30L400K5D2J3SCP1GA3MUB3DA20DB1

Feature	Code	Description
Type	T3	Remote probe
Enclosure material	HS3	Die-cast aluminium (AlSi9Cu3)
Measuring range	HV30	0...40 m/s (0...8 000 ft/min)
Probe length	L400	400 mm (15.75")
Probe cable length (incl. probe length)	K5	5 m (16.4 ft)
Display	D2	Display with backlight
Electrical connection	No code	Cable glands
Analogue output	No code	0 - 10 V or 4 - 20 mA
Digital interface	J3	RS485 with Modbus RTU
Sensor control port	SCP1	Modbus RTU via M12 socket
Additional module	No code	Without additional module
Output	GA3	0 - 10 V (applies to both outputs)
Output 1 measurand	No code	Temperature T [°C]
Output 1 scaling low	No code	0
Output 1 scaling high	No code	50
Output 2 measurand	No code	Air velocity standardised v [m/s]
Output 2 scaling low	No code	0
Output 2 scaling high	No code	40
Medium 1	No code	Air
Medium 2	MUB3	CO ₂
Duct cross section	No code	Factory pre-setting
Measurand displayed 1	DA20	Air velocity v [m/s]
Measurand displayed 2	DB1	Temperature T [°C]

Accessories

Description	Code
E+E Product Configuration Software (Free download: www.epluse.com/pcs10)	PCS10
Modbus pressure probe, 0...10 bar abs.	HA600001
Connection cable, unshielded, 5 poles, M12x1 plug ↔ socket	
2 m (6.6 ft)	HA010813
5 m (16.4 ft)	HA010814
10 m (32.8 ft)	HA010815



Company Headquarters &
Production Site

E+E Elektronik Ges.m.b.H.
Langwiesen 7
4209 Engerwitzdorf | Austria
T +43 7235 605-0
F +43 7235 605-8
info@epluse.com
www.epluse.com

Subsidiaries

E+E Sensor Technology (Shanghai) Co., Ltd.
T +86 21 6117 6129
info@epluse.cn

E+E Elektronik France SARL
T +33 4 74 72 35 82
info.fr@epluse.com

E+E Elektronik Deutschland GmbH
T +49 6171 69411-0
info.de@epluse.com

E+E Elektronik India Private Limited
T +91 990 440 5400
info.in@epluse.com

E+E Elektronik Italia S.r.l.
T +39 02 2707 86 36
info.it@epluse.com

E+E Elektronik Korea Ltd.
T +82 31 732 6050
info.kr@epluse.com

E+E Elektronik Corporation
T +1 847 490 0520
info.us@epluse.com



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